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EXAMINER	
CAMPOS, YAIMA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/790,175	WATANABE, NAOKI	
	Examiner	**Art Unit**	
	Yaima Campos	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

RESPONSE TO AMENDMENT

1. The examiner acknowledges the applicant's submission of the amendment dated March 7, 2007. At this point claims 1, 8 and 15 have been amended and no claims have been canceled. There are 21 claims pending in the application; there are 3 independent claims and 18 dependent claims, all of which are ready for examination by the examiner.

REJECTIONS NOT BASED ON PRIOR ART

Claim Rejections - 35 USC § 112

2. Applicant has amended the claims to remove the deficiencies with respect to 35 U.S.C. 112 previously present; therefore, the rejection of claims 1-21 under 35 U.S.C. 112, second paragraph has been withdrawn.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-2, 5-9, 12-16 and 19-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Duyanovich et al. (US 5,555,371) in view of Berger et al. (US 5,051,887), Crockett et al. (US 6,578,120) and Crockett et al. (US 2001/0010070).

5. As per **claims 1, 8 and 15**, Duyanovich discloses "In a system including a plurality of primary storage subsystems and a plurality of secondary storage subsystems that are connected to each other via a network, and a host computer connected with the secondary storage subsystems, a method for remotely copying data of each of a plurality of primary volumes to a corresponding secondary volume from a plurality of secondary volumes, wherein the primary volumes are constituted by the primary storage subsystems, and wherein the secondary volumes are constituted by the secondary storage subsystems," as **["Primary data processing system 1 generates data that are to be backed up for disaster recovery purposes. Secondary data processing system 2 receives such data for disaster backup and recovery" (Column 6, lines 49-52) wherein "data are stored in peripheral data-storage system 13 that can be a typical multi-path plural-device data-storage system, hereinafter termed the primary data-storage system 13" (Column 11, lines 29-32) which comprise different storage subsystems within first storage system; note that "secondary storage system 19" is shown with a similar structure (Figure 2). Furthermore, it is specified that primary storage system comprises DASDs formed by different controllers, which are referred to as "subsystems" for performing updates to primary storage system (Columns 14-15, lines 61-18; Figures 2-4). Duyanovich also explains that "System inter-connection 3 operatively couples primary system 1 and secondary system 2 for effecting remote dual copying" (Figure 2 and Column 7, lines 55-57). Duyanovich further discloses having "secondary host system 18" within secondary storage subsystem (Figure 2)]**

"the method comprising:"

(1) a normal synchronization procedure including: **[Duyanovich discloses "primary data processing system 1 generates data that are to be backed up for disaster recovery purposes... makes the two copies of all data to be congruent and have only valid data" (Col. 7, line 46-Col. 8, line 2)]**

"receiving, at each of the secondary storage subsystems, remote copy requests each of which is associated with a timestamp from each one of the plurality of primary storage subsystems;" **[Duyanovich discloses this limitation as "time stamps may be maintained in a host systems and sent with each input-output (IO) operation" (Column 8, lines 28-29) wherein "the primary system 1 creates a remote copy session over system inter-connection 3 with secondary system" (Figure 2 and Column 8, lines 34-36)]**

receiving periodically, at each of the secondary storage subsystems, synchronizing requests each of which is associated with a timestamp of a primary storage subsystem, which sends a respective synchronizing request, from said one of the primary storage subsystem; **[Duyanovich discloses this concept as it is taught that "for obtaining congruence between the systems 1 and 2 copies of data, it is necessary to determine the primary system 1 update sequence in secondary system 2" (Column 9, lines 36-39), "the primary host then generates a COMMIT command and inter-system message to be sent to secondary system 2" (Figure 2 and Column 14, lines 21-22) wherein "the COMMIT issuing host system 12 creates a times stamp for the COMMIT function" (Column 14, lines 24-25), after this COMMIT command, "secondary data-storage system updates secondary directory" (Column 14, lines 30-31) and also discloses that this action "provides update integrity in secondary system 2 of the updated data for ensuring congruence of the remote data copy in the secondary**

system 2 to the primary copy in primary system 1" (Column 14, lines 49-52) as a command sent from a host to synchronize a data storage system with another data storage system. Duyanovich also explains that "a host system such that primary data-storage system maintains a time stamp value synchronized with the host system time stamp clock" (Column 8, lines 31-33) as time stamps are later used to synchronize a secondary system with "primary data-storage system"]. Duyanovich also discloses having storage Ids of subsystems that update data along with each data update as **["Along with each dual data copy is a time stamp and indication of the subsystem used to write the data to primary data-storage system 13" which is referred to as a sequence number (Column 9, lines 55-57); "each sequence number is assigned by primary data storage system 13 for identifying which storage subsystem 100, 11 (FIG. 9) effected the storage of each update data record or other data unit" (Column 10, lines 23-26) wherein "such determination of sequence of recording enables system 2 to replicate the system 1 updating sequence for ensuring congruence of the remotely stored copy of the updated data with the primary system copy of such updated data by preserving update sequence integrity" (Column 10, lines 37-42) as using a sequence number/subsystem Id and timestamp for obtaining data consistency]** "determining, at each of the secondary storage subsystems, a first time as a first time parameter based on [[the]] timestamps included in the sync requests;" **[With respect to this limitation, Duyanovich discloses that "the COMMIT issuing host system 12 creates a times stamp for the COMMIT function" (Column 14, lines 24-25)" wherein "the delayed updating of secondary directory is effective as of the latest time stamp value in the COMMIT command" (Column 20, lines 35-36)]**

and determining, at each of the secondary storage subsystems, which remote copy requests to process based on the first time parameter and timestamps associated with the remote copy requests, thereby maintain data I/O consistency among said storage subsystems [**With respect to this limitation, Duyanovich discloses that "along with each dual data copy is a time stamp (time of updating indication) and indication of the subsystem used to write the data to primary data-storage system 13. These time stamps and sequence numbers are stored in pending write directory 35 along with identification of the dual copied data and the address at which such dual copied data are stored in secondary data-storage system 19. Such time stamps will be used later to select which data to make addressable in the second data-storage system 19. That is, updating secondary directory 34 is deferred until termination of a current pending write session" (Column 9, 55-65) as "comparing the sequence numbers and time stamps, the integrity of data copying and the action sequence of data updating is determined" (Column 10, lines 34-37); therefore, I/O or update consistency is maintained between primary and secondary systems**]. Duyanovich also explains [**"primary data processing system 1 generates data that are to be backed up for disaster recovery purposes... Recovery from a disaster is not part of this description" (Col. 7, line 46-Col. 8, line 2)**].

Duyanovich does not disclose expressly maintaining "primary storage IDs" associated with remote copy requests and does not explicitly disclose the details of having (2) an after-failure synchronization procedure including: suspending said remote copy requests after a failure occurs; collecting and comparing by the host computer time parameters stored in the secondary storage systems to determine a synchronized time; receiving from said host computer at each of

the secondary storage subsystems synchronizing requests each of which includes said synchronized time; updating second time parameters at each of the secondary storage subsystems up to said synchronized time; and determining, at each of the secondary storage subsystems, which remote copy requests to process based on said updated second time parameter, thereby maintaining dada I/O consistency among said storage subsystems nor *an after-failure synchronizing procedure executed by the RCM in the host computer and the secondary storage subsystems.*

Berger discloses the concept of maintaining "primary storage IDs" associated with remote copy requests as [**a systems of "storage devices for the input and output of information to a data processing system" in which "each write to the primary storage device is also written to a secondary storage device" to maintain data synchronization (Column 1, lines 13-24) wherein "device identification is kept on all devices in the subsystem" (Column 6, lines 16-17 and 40-56)**].

Crocket (US 6,578,120) discloses [**"loosely-coupled copy operations between a primary and a remote secondary direct access storage device (DASD) through paths managed by a host CPU... updating occurs during initial primary-to-secondary volume synchronization and during resynchronization of the volumes after the occurrence of an I/O error or other outage" (Col. 1, lines 12-21) and explains having "Initial Volume Synchronization" (Col. 7, line 60-Col. 9, line 11) "Ordinary Volume-to-Volume Steady State Copying or Shadowing After Volume Initialization" (Col. 9, line 12-Col. 10, line 18)**]

(2) an after-failure synchronization procedure including: as **["Volume resynchronization-I/O Error or Other Interruptions of XRC Shadowing After Volume Initialization" (Figures 8-10 and related text; Col. 10, line 19-Col. 12, line 5)]**

suspending said remote copy requests after a failure occurs; **["First, responsive to an I/O error or other outage, the host CPU 2 will suspend the primary volume 29 by signaling the counterpart SCUs. The SCUs in turn are still subject to application write updates, and they in turn will operate in a type of bitmap mode. However, since the primary volume 29 has been suspended, no record set copies of the write updates are made by the primary SCU 27" (Col. 10, lines 48-54)]**

collecting and comparing by the host computer time parameters stored in the secondary storage systems to determine a synchronized time; **["the primary SCU to create record sets for any updates to tracks whose corresponding bits are "on" in the monitor bit map and timestamp them... the groups of primary tracks modified during the suspension and their timestamp are read and sent to the secondary SCU" (Col. 11, line 24-29) "resynchronization at the secondary site... the secondary SCU receives in reiterative steps 1005-1113 receives groups of die primary tracks modified before or during suspension, writes out the groups of modified primary tracks modified during the suspension and their timestamp are read and sent to the secondary SCU" (Col. 11, lines 32-38) "timestamp comparison among groups of primary tracks modified before or during suspension, and with record sets or primary tracks modified before or during suspension, and with record sets of primary tracks modified after the start of resynchronization... if the timestamp of the group of record sets is LATER than the timestamp of the group of primary tracks modified before or during**

suspension written to the secondary volume, then the secondary SCU will write out to the secondary volume one or more groups of the tracks and record the associated timestamp and repeat the comparison" (Col. 11, lines 59-65)]

receiving from said host computer at each of the secondary storage subsystems synchronizing requests each of which includes said synchronized time; updating second time parameters at each of the secondary storage subsystems up to said synchronized time; and determining, at each of the secondary storage subsystems, which remote copy requests to process based on said updated second time parameter, thereby maintaining dada I/O consistency among said storage subsystems **["volume resynchronization operations at the primary and remote secondary storage subsystems after the occurrence of an I/O error, fault, outage, or the like"(Col. 10, lines 45-48) "when the secondary SCU 31 processes a group of record sets of primary tracks modified after the volume resynchronization has started, the SCU 31 will write that record set group out to the secondary volume 33 only if the associated highest timestamps bear a time PRIOR to the timestamp of the die group of primary tracks modified before or during suspension written out to the secondary volume. If the timestamp of the group of record sets is LATER than the timestamp of the group of primary tracks modified before or during suspension written to the secondary volume, then the secondary SCU will write out to the secondary volume one or more groups of the tracks and record the associated timestamp and repeat the comparison" (Col. 11, lines 52-65) wherein** ***Data mover 9 is involved in re-synchronization procedure as data to be sent to secondary site is transferred through data mover (Figure 1 and related text)]*** *however, Crockett (6,578,120) discloses*

synchronization is executed by the primary SCU 27 rather than the data mover (which corresponds to the RCM in the host computer) in the host computer.

Crockett et al. (US 2001/0010070) discloses an after-failure synchronizing procedure executed by the RCM in the host computer and the secondary storage subsystems as ***["remote copy is implemented by a separate processing machine called a data mover, coupled to both primary and secondary sites" (Page 1, Par. 0005) "when the error condition ends, the data mover performs a static resynchronization processes... the data mover reads there tracks, and then proceeds to write these read tracks to the backup storage. The data mover also makes an entry in a progress queue, this entry including (1) a group-ID identifying the tracks written to backup storage and (2) a read time-stamp ("RT") identifying the time when the data mover read these tracks from primary storage. The process of identifying, reading, and writing tracks continues until all tracks in the update have been processed" (Page 1, Par. 0013) and explains "the host 102 and data mover 114 may comprise IBM model s/390 machines" (Page 3, Par. 0034) (Figure 1 and related text). Refer to Crocket (US 6,578,120) (Figure 1) for a sample of the IBM model s/390 machine which discloses a host that includes a data mover].***

Duyanovich et al. (US 5,555,371), Berger et al. (US 5,051,887), Crockett et al. (US 6,578,120) and Crockett et al. (US 2001/0010070) are analogous art because they are from the same field of endeavor of data copying and synchronization of data storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the remote copy request system as taught by Duyanovich and further include primary storage identification associated with remote copy requests as taught by Berger and further provide (2) an after-failure synchronization procedure including: suspending said remote

copy requests after a failure occurs; collecting and comparing by the host computer time parameters stored in the secondary storage systems to determine a synchronized time; receiving from said host computer at each of the secondary storage subsystems synchronizing requests each of which includes said synchronized time; updating second time parameters at each of the secondary storage subsystems up to said synchronized time; and determining, at each of the secondary storage subsystems, which remote copy requests to process based on said updated second time parameter, thereby maintaining dada I/O consistency among said storage subsystems as taught by Crockett (US 6,578,120) ***in which re-synchronization is performed in primary SCU 27 and not in data mover in the host and further have the data mover taught by Crockett (US 6,578,120) which is in the host, perform an after-failure synchronization procedure as taught by Crockett (US 2001/0010070) to thereby have an after-failure synchronizing procedure executed by the RCM in the host computer and the secondary storage subsystems.***

The motivation for doing so would have been because Berger discloses that storage device identification should be included with copy requests [**"to insure that the DASD device attached is the one that the subsystem expects" (Column 6, lines 41-42) and "to ensure the retention of information when a power out of other disablement of the devices occur and to verify that the correct physical devices are still attached to the controllers when the data storage device resumes operation" (Column 3, lines 6-12)**]. Crockett (US 6,578,120) further discloses [**"I is yet a related object that such method and means maintain consistency where such updating occurs during initial primary-to-secondary volume synchronization, and during resynchronization of the volumes after the occurrence of an I/O error or other**

outage... reduce the processing overhead associated with the CPU and control units in volume resynchronizing through an efficient scheduling and copying on the secondary volume of primary track updates occurring during the resynchronization interval" (Col. 4, lines 42-52)] and ***Crockett (US 2001/0010070) discloses an after-failure synchronizing procedure executed by the RCM in the host computer and the secondary storage subsystems is done as the invention ["preserves data integrity by maintaining the order of storage operation, despite the receipt of data updates during resynchronization. This helps avoid overwriting newer data with older data. Additionally, the invention helps preserve the smooth storage of data from the user's perspective, despite temporary unavailability of backup storage" (Page 2, Par. 0019)].***

Therefore, it would have been obvious to combine Crockett et al. (US 6,578,120) with Berger et al. (US 5,051,887) and Duyanovich et al. (US 5,555,371) and ***Crockett (US 2001/0010070)*** for the benefit of creating a method of remotely copying data to obtain the invention as specified in claims 1, 8 and 15.

6. As per **claims 2, 9 and 16**, the combination of Duyanovich, Berger, ***Crockett et al. (US 6,578,120) and Crockett (US 2001/0010070)*** discloses "The method of claims 1, 8 and 15, wherein the normal synchronizing procedure" **[See rejection to claim 1 above]** "further includes: performing, at each of the secondary storage subsystems, write processing in accordance with remote copy requests that are associated with timestamps indicating **an** earlier time than the first time" **[With respect to this limitation, Duyanovich discloses that a "when the consistency means determines that all of the updates are complete to the primary data-storage system, then the secondary LSA (DASD) directory is updated as of a**

predetermined time stamp value" (Column 6, lines 46-48) wherein "the delayed updating of secondary directory is effective as of the latest time stamp value in the COMMIT command" (Column 20, lines 34-36) and further teaches an example in which timestamp values earlier than "the lowest time stamp value received from any one subsystem" are included in a current write update session (Column 32-39). Duyanovich also discloses that "secondary data mover receives and records the received data in secondary data-storage system, logs the associated received write sequence tokens in a suitable memory for later use in the delayed update of secondary directory updating for establishing addressability of the recorded data via secondary directory" (Column 14, lines 10-16)].

7. As per **claims 5, 12 and 19**, the combination of Duyanovich, Berger, ***Crockett et al. (US 6,578,120) and Crockett (US 2001/0010070)*** discloses the method of claim 1 **[See rejection to claim 1 above]** wherein the determining step in the after-failure synchronizing procedure involves updating a secondary volume corresponding to the determined remote copy request **[Crockett discloses this limitation as "volume resynchronization has as its object to bring the secondary volume back into consistency again with the primary while operating transparent to the applications and their write updates of the primary volume" (Col. 10, lines 33-43)]**.

8. As per **claim 6, 13 and 20**, the combination of Duyanovich, Berger, ***Crockett et al. (US 6,578,120) and Crockett (US 2001/0010070)*** discloses the method of claims 1, 8 and 15 **[See rejection to claims 1, 8 and 15 above]** wherein the determining step in the after-failure synchronizing procedure involves selecting remote copy requests which are received by the secondary storage subsystems prior to the suspension and have a first time parameter smaller

than or equal to said synchronized time to be processed so as to update a corresponding secondary volume [**"volume resynchronization operations at the primary and remote secondary storage subsystems after the occurrence of an I/O error, fault, outage, or the like"(Col. 10, lines 45-48) "when the secondary SCU 31 processes a group of record sets of primary tracks modified after the volume resynchronization has started, the SCU 31 will write that record set group out to the secondary volume 33 only if the associated highest timestamps bear a time PRIOR to the timestamp of the die group of primary tracks modified before or during suspension written out to the secondary volume. If the timestamp of the group of record sets is LATER than the timestamp of the group of primary tracks modified before or during suspension written to the secondary volume, then the secondary SCU will write out to the secondary volume one or more groups of the tracks and record the associated timestamp and repeat the comparison" (Col. 11, lines 52-65)**].

9. As per __claims 7, 14 and 21__, the combination of Duyanovich, Berger, ***Crockett et al. (US 6,578,120) and Crockett (US 2001/0010070)*** discloses "claims 6, 13 and 20" wherein [**See rejection to claims 6, 13 and 20 above**] remote copy requests which are received by the secondary storage subsystems prior to the suspension and have a first time parameter bigger than said synchronized time are used to update a bitmap of a corresponding secondary subsystem [**"volume resynchronization operations at the primary and remote secondary storage subsystems after the occurrence of an I/O error, fault, outage, or the like"(Col. 10, lines 45-48) "when the secondary SCU 31 processes a group of record sets of primary tracks modified after the volume resynchronization has started, the SCU 31 will write that record**

set group out to the secondary volume 33 only if the associated highest timestamps bear a time PRIOR to the timestamp of the die group of primary tracks modified before or during suspension written out to the secondary volume. If the timestamp of the group of record sets is LATER than the timestamp of the group of primary tracks modified before or during suspension written to the secondary volume, then the secondary SCU will write out to the secondary volume one or more groups of the tracks and record the associated timestamp and repeat the comparison" (Col. 11, lines 52-65)].

10. **Claims 3-4, 10-11 and 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Duyanovich et al. (US 5,555,371), Berger et al. (US 5,051,887), Crockett et al. (US 6,578,120) and ***Crockett (US 2001/0010070)*** as applied to claims 1-2, 8-9 and 15-16 above, and further in view of Li et a. (US 6,938,045).

11. As per **claims 3, 10 and 17**, the combination of Duyanovich, ***Crockett et al. (US 6,578,120) and Crockett (US 2001/0010070)*** discloses "The method of claims 1, 8 and 15, wherein the normal synchronizing procedure" **[See rejection to claims 1, 8 and 18 above]** further includes: managing at each of the secondary storage subsystems, a time parameter for each of the primary storage subsystems as **[With respect to this limitation, Duyanovich discloses that "the time for time stamps is initialized in primary data-storage system by a host system such that primary data-storage system maintains a time stamp value synchronized with the host system time stamp clock. Then primary system 1 creates a remote copy session over system interconnection with secondary system" (Column 8, lines 30-36)]** and also discloses having a sync request wherein a secondary storage system will processes all pending write requests having time stamp values lower than a time stamp value

indicated by this sync request as [**"the primary host then generates a COMMIT command and inter-system message to be sent to secondary system 2" (Figure 2 and Column 14, lines 21-22) wherein "the COMMIT issuing host system 12 creates a times stamp for the COMMIT function" (Column 14, lines 24-25), after this COMMIT command, "secondary data-storage system updates secondary directory" (Column 14, lines 30-31) and also discloses that this action "provides update integrity in secondary system 2 of the updated data for ensuring congruence of the remote data copy in the secondary system 2 to the primary copy in primary system 1" (Column 14, lines 49-52). Please note that "COMMIT" command is equivalent to a sync request (Column 20, lines 29-36)**] but fails to disclose expressly having "a second time parameter," nor "updating corresponding second time parameters at each of the secondary storage subsystems in response to whether timestamps associated with the sync requests indicate a later time than the corresponding second time parameters of the second storage subsystems."

Li discloses having "a second time parameter" and "updating corresponding second time parameters at each of the secondary storage subsystems in response to whether timestamps associated with the sync requests indicate a later time than the corresponding second time parameters of the second storage subsystems" as [**"the present invention relates to a computer system architecture for synchronizing two remote, and independent, computer servers intended for maintaining duplicates of each other's files" (Column 1, lines 10-13) wherein "a first aspect provides a File-Modified-Date (FMD) parameter and a Directory-Modified-Date (DMD) parameter used for synchronizing changes made to a file package (i.e. a collection of files) stored in a first computing device with an associated database**" as

providing a first and a second time parameters. Li also teaches that "**A second aspect of the invention assumes that the first and second computing devices are part of a local, first file server, and provides a first Package-Modified-Date (PMD) parameter stored within the first file server and associated with a specific file package, and provides a second Package-Modified-Date (PMD) parameter stored in a second database maintained in a remote, second file server." And explains that "the first and second PMD parameters permit the local file server and the remote file server to synchronize their respective databases and associated file packages" (Columns 2-3, lines 59-67 and 1-6) as further explaining the existence of first and second time parameters used to synchronize two remote data storage systems. Li discloses that "if the DMD parameter indicates a more recent change, then the first computing devices updates the data record in the second computing device. Furthermore, the FMD parameter in the second computing device is made equal to the DMD parameter from the first computing device" (Column 3, lines 37-43) as demonstrating updates made to a second time parameter**].

Duyanovich et al. (US 5,555,371), Berger et al. (US 5,051,887), Crockett et al. (US 6,578,120), ***Crockett (US 2001/0010070)*** and Li et al. (US 6,938,045) are analogous art because they are from the same field of endeavor of remote copying and synchronization of data storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the remote data copying system as taught by the combination of Duyanovich, Berger and Crockett, which includes a synchronization request, further include a second time parameter which is modified when the sync requests indicate a later time than the corresponding

second time parameters as changes made to a first storage system need to be updated in a second storage system as taught by Li.

The motivation for doing so would have been because Li teaches that [**"the first and second PMD parameters permit the local file server and the remote file server to synchronize their respective databases and associated file packages" (Column 3, lines 4-6) and also explains that the invention permits "a database on a first computing device to synchronize itself with changes to an associated file package in another computing devices without requiring that the database be notified of modifications to the file package on a change-by-change basis" (Column 2, lines 38-44)**].

Therefore, it would have been obvious to combine Li et al. (US 6,938,045) with Duyanovich et al. (US 5,555,371), Berger et al. (US 5,051,887), Crockett et al. (US 6,578,120) and ***Crockett (US 2001/0010070)*** for the benefit of creating a remote data copying system to obtain the invention as specified in claims 3, 10 and 17.

12. As per **claims 4, 11 and 18**, the combination of Duyanovich, Berger, Crockett (US 6,578,120), ***Crockett (US 2001/0010070)*** and Li discloses "claims 3, 10 and 17," **[See rejection to claim 3 above and rejection to claims 10 and 17 bellow]** "wherein the first time is the earliest time indicated by the second time parameters" **[With respect to this limitation Duyanovich discloses an example in which timestamp values earlier than "the lowest time stamp value received from any one subsystem" are included in a current write update session (Column 32-39) as having the earliest time be a cutoff time to update/synchronize a second storage system with a first storage system]**.

ACKNOWLEDGMENT OF ISSUES RAISED BY THE APPLICANT

Response to Amendment

13. Applicant's arguments filed March 7, 2007 have been fully considered but they are moot in view of new grounds of rejection.

14. As required by **M.P.E.P. § 707.07(f)**, a response to these arguments appears below.

ARGUMENTS CONCERNING PRIOR ART REJECTIONS

15. Claims must be given the broadest reasonable interpretation during examination and limitations appearing in the specification but not recited in the claim are not read into the claim (See M.P.E.P. 2111 [R-1]).

16. All arguments by the applicant are believed to be covered in the body of the office action and thus, this action constitutes a complete response to the issues raised in the remarks dated March 7, 2007.

CLOSING COMMENTS

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

STATUS OF CLAIMS IN THE APPLICATION

17. The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. § 707.07(i)**

a(1) CLAIMS REJECTED IN THE APPLICATION

18. Per the instant office action, **claims 1-21** have received a second action on the merits and are subject of a final rejection.

DIRECTION OF ALL FUTURE REMARKS

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaima Campos whose telephone number is (571) 272-1232. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

IMPORTANT NOTE

20. If attempts to reach the above noted Examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Sanjiv Shah, can be reached at the following telephone number: Area Code (571) 272-4098.

21. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 8, 2007

Yaima Campos
Examiner
Art Unit 2185

SANJIV SHAH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100